

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of
Masaru HIDAKA et al.

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DECLARATION OF UNDER 37 C.F.R. 1.132

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Honorable Commissioner of
Patents and Trademarks
Alexandria, VA 22313-1450

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I, Takaharu NAKAGAWA, residing at 2-16-19 Kikumidai,
Heguri-cho, Ikoma-gun, Nara, Japan, declare and say as
follows:

1. I am one of the joint inventors of the above
identified application;

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2. I graduated from the Department of Chemical
Engineering, Faculty of Engineering, Kobe University, Hyogo,
Japan in March 1981 and received a Master Degree in Chemical
Engineering from the Graduate School of Kobe University in
March 1983;

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3. Since April 1983 to the present, I have been
employed by Panasonic Electric Works Co., Ltd., the former
Matsushita Electric Works, Ltd. Since 1983 to 2001, I was
engaged in the research works on the development of energy
equipment-related technology, garbage processor-related
30 technology, deodorization treatment-related technology, and
so on. Since 2001 to the present, I have been engaged in
the research works on the development of FRP recycling
technology.

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4. I read the Office Action issued on April 3, 2009 in
the above identified application and the prior arts cited
therein.

Then, I carried out experiments for showing that the effects of the present invention are obtained only by decomposing a crosslinked polyester having no chlorine with sub- or supercritical water in the presence of a base
5 selected from CaCO_3 , BaCO_3 and $\text{Ca}(\text{OH})_2$ in an amount of 50 to 200 parts by weight relative to 100 parts by weight of the crosslinked polyester, and such effects are not obtained by decomposing polymers other than a crosslinked polyester having no chlorine.

10 I beg to report the results of the experiments below.

Experiment

(Experimental Example 1)

15 (Experimental Example 1-1)

The same procedure as in Comparative Example 1 of the present specification was repeated except for using an ABS resin (Toray Industries, Inc., "Toyolac 100") as a cured resin instead of an unsaturated polyester resin. The
20 undecomposed resin existed in the content of the reaction tube 13 as shown in Fig. 2 of the present specification, and the decomposition rate was calculated. The results of Experimental Example 1-1 are shown in Table A.

25 (Experimental Example 1-2)

The same procedure as in Experimental Example 1-1 was repeated except for using calcium carbonate as a water-insoluble base. The undecomposed resin existed in the content of the reaction tube 13, and the decomposition rate
30 was calculated. The results of Experimental Example 1-2 are shown in Table A.

(Experimental Example 1-3)

The same procedure as in Experimental Example 1-2 was repeated except for using calcium hydroxide as a water-insoluble base instead of calcium carbonate. The undecomposed resin existed in the content of the reaction tube 13, and the decomposition rate was calculated. The results of Experimental Example 1-3 are shown in Table A.

(Experimental Example 1-4)

The same procedure as in Experimental Example 1-2 was repeated except for using barium carbonate as a water-insoluble base instead of calcium carbonate. The undecomposed resin existed in the content of the reaction tube 13, and the decomposition rate was calculated. The results of Experimental Example 1-4 are shown in Table A.

(Experimental Example 2)

(Experimental Example 2-1)

The same procedure as in Comparative Example 1 of the present specification was repeated except for using a polypropylene (Japan Polypropylene Corporation, "FX4E") as a cured resin instead of an unsaturated polyester resin. The undecomposed resin existed in the content of the reaction tube 13 as shown in Fig. 2 of the present specification, and the decomposition rate was calculated. The results of Experimental Example 2-1 are shown in Table B.

(Experimental Example 2-2)

The same procedure as in Experimental Example 2-1 was repeated except for using calcium carbonate as a water-insoluble base. The undecomposed resin existed in the content of the reaction tube 13, and the decomposition rate was calculated. The results of Experimental Example 2-2 are shown in Table B.

(Experimental Example 2-3)

The same procedure as in Experimental Example 2-2 was repeated except for using calcium hydroxide as a water-insoluble base instead of calcium carbonate. The undecomposed resin existed in the content of the reaction tube 13, and the decomposition rate was calculated. The results of Experimental Example 2-3 are shown in Table B.

10 (Experimental Example 2-4)

The same procedure as in Experimental Example 2-2 was repeated except for using barium carbonate as a water-insoluble base instead of calcium carbonate. The undecomposed resin existed in the content of the reaction tube 13, and the decomposition rate was calculated. The results of Experimental Example 2-4 are shown in Table B.

(Experimental Example 3)

(Experimental Example 3-1)

20 The same procedure as in Comparative Example 1 of the present specification was repeated except for using a cured resin obtained by curing a resol resin used in a phenolic resin molding material (Panasonic Electric Works Co., Ltd., PN: CY9610) at 150°C for 20 min. as a cured resin instead of an unsaturated polyester resin. The undecomposed resin existed in the content of the reaction tube 13 as shown in Fig. 2 of the present specification, and the decomposition rate was calculated. The results of Experimental Example 3-1 are shown in Table C.

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(Experimental Example 3-2)

The same procedure as in Experimental Example 3-1 was repeated except for using calcium carbonate as a water-

insoluble base. The undecomposed resin existed in the content of the reaction tube 13, and the decomposition rate was calculated. The results of Experimental Example 3-2 are shown in Table C.

5

(Experimental Example 3-3)

The same procedure as in Experimental Example 3-2 was repeated except for using calcium hydroxide as a water-insoluble base instead of calcium carbonate. The undecomposed resin existed in the content of the reaction tube 13, and the decomposition rate was calculated. The results of Experimental Example 3-3 are shown in Table C.

(Experimental Example 3-4)

The same procedure as in Experimental Example 3-2 was repeated except for using barium carbonate as a water-insoluble base instead of calcium carbonate. The undecomposed resin existed in the content of the reaction tube 13, and the decomposition rate was calculated. The results of Experimental Example 3-4 are shown in Table C.

[Table A]

(ABS resin)

	Exp. Ex. 1-1	Exp. Ex. 1-2	Exp. Ex. 1-3	Exp. Ex. 1-4
Decomposition temperature	360°C	360°C	360°C	360°C
Decomposition pressure	18.7 MPa	18.7 MPa	18.7 MPa	18.7 MPa
Decomposition time	20 min.	20 min.	20 min.	20 min.
Base	-	CaCO ₃	Ca(OH) ₂	BaCO ₃
pH before Decomposition	7.9	9.7	13.4	9.4
pH after Decomposition	10.2	9.9	13.4	10.0
Decomposition rate	9.0%	7.5%	5.9%	6.3%

5 [Table B]

(Polypropylene)

	Exp. Ex. 2-1	Exp. Ex. 2-2	Exp. Ex. 2-3	Exp. Ex. 2-4
Decomposition temperature	360°C	360°C	360°C	360°C
Decomposition pressure	18.7 MPa	18.7 MPa	18.7 MPa	18.7 MPa
Decomposition time	20 min.	20 min.	20 min.	20 min.
Base	-	CaCO ₃	Ca(OH) ₂	BaCO ₃
pH before Decomposition	8.6	9.7	13.4	9.4
pH after Decomposition	6.8	7.4	13.3	7.2
Decomposition rate	2.1%	2.0%	2.2%	2.9%

[Table C]
(Phenolic resin)

	Exp. Ex. 3-1	Exp. Ex. 3-2	Exp. Ex. 3-3	Exp. Ex. 3-4
Decomposition temperature	360°C	360°C	360°C	360°C
Decomposition pressure	18.7 MPa	18.7 MPa	18.7 MPa	18.7 MPa
Decomposition time	20 min.	20 min.	20 min.	20 min.
Base	-	CaCO ₃	Ca(OH) ₂	BaCO ₃
pH before Decomposition	8.6	9.7	13.4	9.4
pH after Decomposition	5.9	6.5	13.0	6.5
Decomposition rate	7.8%	10.8%	16.4%	12.3%

5 The undersigned declares further that all statements
made herein of this own knowledge are true and that all
statements made on information and belief are believed to be
true; and further that these statements were made with the
knowledge that willful false statements and the like so that
10 made are punishable by fine or imprisonment, or both, under
18 U.S. Code 1001 and that such willful false statements may
be jeopardize the validity of this application or any patent
issuing thereon.

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Takaharu Nakagawa

Takaharu NAKAGAWA

Dated this 30 day of June, 2009